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STANFORD UNIVERSITY, with the cooperation of Dr. N. L. Britton, director of the New York Botanical Garden, has arranged to finance the publication of an Illustrated Flora of the Pacific Coast. Dr. LeRoy Abrams will edit the work, with the assistance of a number of the leading American botanists as collaborators. The flora will comprise four volumes containing illustrations and descriptions of every species of ferns and flowering plants on the Pacific coast.

At a meeting of the council of the National Museum of Wales, held at Cardiff, on October 28, it was announced, according to *Nature*, that a sum of £10,000 had been received from Capt. W. R. Smith, senior partner of the firm of W. R. Smith and Son, Cardiff, and Mrs. Smith, towards the building fund of the new museum. The donors had made this gift in the belief that the National Museum would be one of the first educational influences in the principality. There were other donors, who wished to remain anonymous for the present, and it is expected that when the present contract has been paid there will be a balance of about £16,000 towards the £50,000 which is needed to complete the furnishing and equipment of the portion of the building at present in course of erection.

THE Embar formation of Wyoming is known chiefly for its extensive phosphate beds, which are supposed to have been derived in some manner from animal remains. The rocks contain abundant fossils, many of which are phosphatic, and all of which prove that the Embar beds of western Wyoming were deposited in the sea. Recent study of the eastward extension of the Embar formation in Wyoming shows that along the east margin of this ancient sea, or throughout the Bighorn Mountain region, the climate was probably more arid than that of any part of Wyoming to-day. By long evaporation beds of gypsum were deposited at some places in arms of this sea to a thickness as great as 100 feet. It is a question of practical importance whether beds of salt, and perhaps of potash salt, may also have been deposited in this formation and whether they may now be found below the

surface. The United States Geological Survey, Department of the Interior, urges that oil men, in drilling through the Chugwater and Embar red beds in Wyoming collect samples of drillings and of brines and submit them to the survey for examination as to their possible potash content.

#### UNIVERSITY AND EDUCATIONAL NEWS

At the meeting of the trustees of the Carnegie Foundation for the Advancement of Teaching, held in New York on November 15, the proposal to make the pension system contributory was considered and action was postponed. This was the recommendation of the committee of the American Association of University Professors which was represented at the meeting of the trustees by Professor Edwin R. A. Seligman, vice-president of the association, and Dean Harlan F. Stone, chairman of the committee that drew up the report on the subject. The proposed plan of contributory pensions was referred to a committee composed of Dr. Henry S. Pritchett, president of the foundation; Dr. W. F. Slocum, president of Colorado College, chairman of the board; Sir William Peterson, president of McGill University; President Charles R. Van Hise, of the University of Wisconsin; President A. Lawrence Lowell, of Harvard University, and Chancellor T. B. McCormick, of the University of Pittsburgh, representing the foundation, and five representatives from the American Association of University Professors, the Association of American Universities, the National Association of State Universities and the Association of American Colleges.

THE chemistry building at the State College of Agriculture and Mechanic Arts of the University of Montana, Bozeman, was completely destroyed by fire on October 20. This building furnished quarters for the college and experiment station departments of chemistry, the state food and water laboratory and the departments of physics and geology. The fire occurred in the day time and all department's records, the chemical library and the materials in the chemical and geological museums were

saved together with part of the apparatus. Chancellor Elliott has announced that a new chemistry building will be erected as soon as possible.

FINAL plans have been drawn for a head house for the school of applied science of the Carnegie Institute of Technology, which is to cost \$300,000. A portion of the building will be four stories high and the remainder ten. Construction work will start as soon as steel deliveries can be made. The structure will house the executive offices and library of the engineering school, and the departments of modern languages, machine design and commercial engineering.

DR. H. E. EGGERS has been appointed professor of pathology and bacteriology, Dr. Amos W. Peters, assistant professor of biochemistry, and Dr. John T. Myers, instructor in bacteriology, in the college of medicine of the University of Nebraska, Omaha.

PROFESSOR J. VERSLUYS, who has held the chair of zoology and comparative anatomy at Giessen since 1907, has been appointed to the corresponding chair in the new Flemish University at Gent.

THE *Journal* of the American Medical Association indicates that negotiations are pending that may bring Professor R. Bárány, of Vienna, to the University of Stockholm as professor of otology and rhinolaryngology. He recently delivered at Stockholm the customary address describing his research when presented with the Nobel prize. It will be remembered that he was a war prisoner in Russia when notified that the prize in medicine had been conferred on him.

#### DISCUSSION AND CORRESPONDENCE CAN A BODY EXERT A FORCE UPON ITSELF?

IN connection with our annual attempt to give our students a few clear ideas about elementary dynamics, the question of the meaning to be assigned to the word *force* perennially arises. May I call attention to a well-known phenomenon which seems well suited to serve as a shibboleth in distinguishing between clear and hazy conceptions of force?

Let a liquid be uniformly rotated in an open vessel. What are the forces acting on each surface particle? Why is the free surface parabolic?

In answering these questions one recent author finds it necessary unwittingly to deny all three of the laws of motion. He states that "When a liquid is at rest or in equilibrium *the resultant of all the forces acting on a particle in its free surface is perpendicular to the surface at that point*" [whereas according to the first law the resultant force must be zero]. In the case of a rotating liquid, we are told, "the resultant force acting on the surface particles is due not only to gravity, but to centrifugal force. . . . It will be noted that the resultant force [shown drawn perpendicular to the free surface] is greater at points higher up on the surface, so that a surface particle near the top presses against the surrounding liquid with far more force than it would if at the bottom of the curve." But according to the second law the resultant force must be in the direction of the resultant acceleration, which in this case is obviously centripetal; and according to the third law, if the particle presses against the surrounding liquid, the liquid must press back upon it with an equal and opposite force not mentioned by the author.

Such an explanation is evidently completely misleading. Yet another recent text-book does equal violence to the laws of motion in explaining the same phenomenon. "The resultant force," we are told, "is made up of two components; one of these is the weight of the particle,  $mg$ , the other is the reaction which the particle offers against acceleration toward the center by the centripetal force  $m\omega^2$ ."

Of course the trouble is that among mathematical physicists it has been customary to reduce such problems to purely statical ones by introducing centrifugal forces in accordance with D'Alembert's principle; but authors of elementary texts sometimes forget that the forces so introduced are purely imaginary.

Does not the third law mean this: A body *A* can not exert a force upon itself as a whole; any force acting on it must be due to, that is, associated with, the existence of, some